

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Serial Number: 10/666,115

Filing Date: September 19, 2003

Title: Differential Pressure Valve Employing Near-Balanced Pressure

IN THE CLAIMS

Please amend the claims as follows:

1. (Cancelled)
2. (Currently Amended) The valve of claim [1] 27 wherein there is an the interface between the diaphragm and the delivery passageway that nozzle is at least substantially greater than 0.55% is about 17% of the surface area of the diaphragm.
3. (Cancelled)
4. (Currently Amended) The valve of claim [1] 27 wherein the delivery passageway nozzle includes a filter element at the interface with the diaphragm.
5. (Original) The valve of claim 4 wherein the filter element has a porosity of about 20 μm .
6. (Cancelled)
7. (Currently Amended) A pneumatic differential pressure valve, comprising:
a nozzle in communication with a pressurized supply of a medium and having a head for delivering [a] the pressurized supply of [a] the medium to a delivery outlet;
a control chamber capable of being pressurized and depressurized; and
a diaphragm disposed between the nozzle head and the delivery outlet and
controlled by pressure in the control chamber, wherein the diaphragm pneumatically seals
the nozzle head when the control chamber is pressurized and pneumatically releases from
the nozzle head in response to a reduction in pressure in the control chamber, and
wherein the surface area if the nozzle head in contact with the diaphragm is computed so
that the diaphragm pneumatically releases from the nozzle head without mechanical
assistance surface area of the diaphragm communicating with the nozzle head is

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~~substantially greater than 0.55% of the surface area of the diaphragm in communication with the control chamber.~~

8. (Currently Amended) The valve of claim 7 wherein the nozzle head includes is ~~e~~coupled to a filter element.
9. (Original) The valve of claim 8 wherein the filter element has a porosity of about 20 μm .
10. (Currently Amended) The valve of claim 7 wherein surface area of the nozzle head is at least substantially greater than 0.55% is about 17% of the surface area of the diaphragm in contact with the control chamber.
11. (Original) The valve of claim 7 wherein the control chamber can be pressurized to at least about 22 PSI.
12. (Currently Amended) A pneumatic differential pressure valve for supplying a flow of a gas, comprising:
 - a gas reservoir for storing a supply of gas at a delivery pressure;
 - an outlet for delivering the supply of gas from the gas reservoir;
 - a nozzle having a head disposed between the gas reservoir and the outlet, the nozzle being pneumatically coupled to the gas reservoir so that gas in the nozzle head is pressurized to the delivery pressure;
 - a diaphragm for actuating the flow of gas from the nozzle head to the outlet; and
 - a timing gas chamber for controlling the diaphragm, the diaphragm pneumatically sealing the nozzle head when the timing gas chamber is pressurized and pneumatically releasing from the nozzle head when the pressure in the timing gas chamber is depressurized ~~reduced~~, wherein the foreed forces exerted on the diaphragm by the pressurized timing gas chamber [is] ~~are~~ substantially balanced by an opposing pneumatic

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force on the diaphragm such that the diaphragm pneumatically releases from the nozzle head without mechanical assistance.

13. (Original) The valve of claim 12 wherein the gas reservoir and the timing gas chamber are pressurized to the delivery pressures.
14. (Original) The valve of claim 12 wherein the nozzle head includes a filter element.
15. (Original) The valve of claim 14 wherein the filter element has a porosity of about 20 μm .
16. (Original) The valve of claim 14 wherein the filter element is fabricated from sintered bronze.
17. (Original) The valve of claim 12 wherein substantially balanced comprises having a ratio of the opposing pneumatic force to the timing gas chamber force of less than 1:2.4.
18. (Original) The valve of claim 17 wherein the ratio is about 1:2 or less.
19. (Currently Amended) A gas flow device for delivering a regulated flow of a gas, comprising:
 - a housing connectable to a source of compressed gas and having an delivery port for delivering a regulated flow of the gas;
 - a gas flow path within the housing from the source of compressed gas and to the delivery port; and
 - a nozzle disposed in the gas flow path, wherein the gas flow through the nozzle exits through includes a filter element.

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20. (Original) The gas flow device of claim 19 wherein the filter element is made from sintered bronze.
21. (Original) The gas flow device of claim 19 wherein the filter element has a uniform porosity.
22. (Currently Amended) The gas flow device of claim 19 wherein the gas flow path includes a pneumatic differential pressure valve, the nozzle forming a part of the valve.
23. (Cancelled)
24. (Withdrawn—Currently Amended) A method of making a pneumatic differential pressure valve, comprising:
 - providing a nozzle having a head in communication with a pressurized supply of a medium and for delivering [a] the pressurized supply of [a] the medium to a delivery outlet;
 - forming a control chamber capable of being pressurized and depressurized; and
 - disposing a diaphragm between the nozzle head and the delivery outlet and controlled by pressure in the control chamber, wherein the diaphragm pneumatically seals the nozzle head when the control chamber is pressurized and pneumatically releases from the nozzle head in response to a reduction in pressure in the control chamber, and wherein the surface area if the nozzle head in contact with the diaphragm is computed so that the diaphragm pneumatically releases from the nozzle head without mechanical assistance surface area of the diaphragm communicating with the nozzle head is substantially greater than 0.55% of the surface area of the diaphragm in communication with the control chamber.
25. (Withdrawn—Currently Amended) A method of making a pneumatic differential pressure valve for supplying a flow of a gas, comprising:

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forming a gas reservoir for storing a supply of gas at a delivery pressure;
forming an outlet for delivering the supply of gas from the gas reservoir;
disposing a nozzle having a head between the gas reservoir and the outlet, the
nozzle being pneumatically coupled to the gas reservoir so that gas in the nozzle head is
pressurized to the delivery pressure;
positioning a diaphragm for actuating the flow of gas from the nozzle head to the
outlet; and
forming a timing gas chamber for controlling the diaphragm, the diaphragm
pneumatically sealing the nozzle head when the timing gas chamber is pressurized and
pneumatically releasing from the nozzle head when the pressure in the timing gas
chamber is depressurized reduced, wherein the forced forces exerted on the diaphragm by
the pressurized timing gas chamber [is] are substantially balanced by an opposing
pneumatic force on the diaphragm such that the diaphragm pneumatically releases from
the nozzle head without mechanical assistance.

26. (Withdrawn—Currently Amended) A method of making a gas flow device for delivering
a regulated flow of a gas, comprising:

 fabricating a housing connectable to a source of compressed gas and having an
 delivery port for delivering a regulated flow of the gas;

 fabricating a gas flow path within the housing from the source of compressed gas
 and the delivery port; and

 disposing a nozzle in the gas flow path, wherein the gas flow through the nozzle
exits through includes a filter element.

27. (New) A pneumatic differential pressure slave valve for use in a demand pressure device,
the valve comprising:

 a control chamber pressurized and depressurized with a gas in response to a pilot
 valve;

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 a delivery chamber having a pressurized gas supply inlet terminating at a nozzle and a delivery outlet terminating at atmospheric pressure; and

 a flexible diaphragm separating the control chamber from the delivery chamber, and disposed between the supply inlet and the delivery outlet to interface with the nozzle, the diaphragm being moveable between an open position displaced from the nozzle and a closed position seated against the nozzle, wherein the diaphragm operates in response to pneumatic pressures without mechanical assistance.

28. (New) The valve of claim 27 wherein the ratio of the force on a closed diaphragm by the delivery chamber to the force on the diaphragm by the pressurized control chamber is less than 1:2.4.
29. (New) The valve of claim 28 wherein the ratio is about 1:2 or less.
30. (New—Withdrawn) A method of making a pneumatic differential pressure slave valve for use in a demand pressure device, the valve comprising:
 - fabricating a control chamber pressurized and depressurized with a gas in response to a pilot valve;
 - fabricating a delivery chamber having a pressurized gas supply inlet terminating at a nozzle and a delivery outlet terminating at atmospheric pressure;
 - separating the control chamber from the delivery chamber by a flexible diaphragm; and
 - disposing the diaphragm between the supply inlet and the delivery outlet to interface with the nozzle, the diaphragm being moveable between an open position displaced from the nozzle and a closed position seated against the nozzle, wherein the diaphragm operates in response to pneumatic pressures without mechanical assistance.